

Stripped Electron Absorber Backscattering

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Stripped Electron Absorber



- Copper absorber located below injection foil collects 545 keV stripped electrons
- Total power is about 2 kW.
- Should function as a “black” absorber so that electrons are not directed back toward the beam and foil.
- If this absorber is not “black”, scattered electrons may land on uncooled stainless-steel vacuum chambers, may contribute to foil heating, and will produce secondary electrons which interact with the beam.
- I believe that a significant fraction of the incident electrons are backscattered toward the foil.

Electron Backscattering

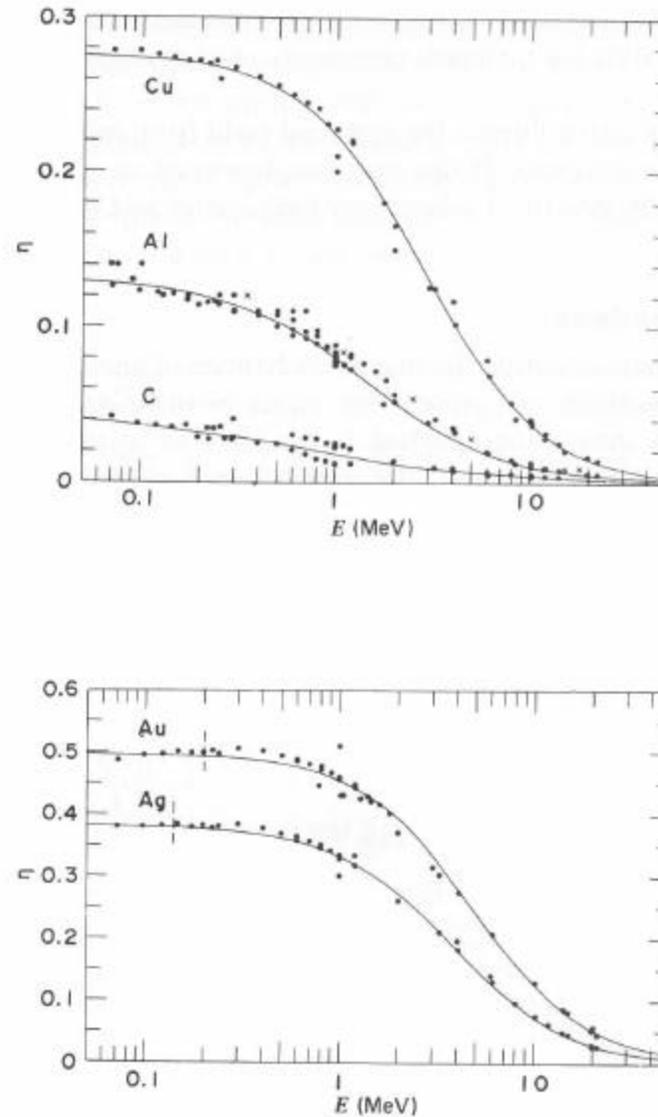
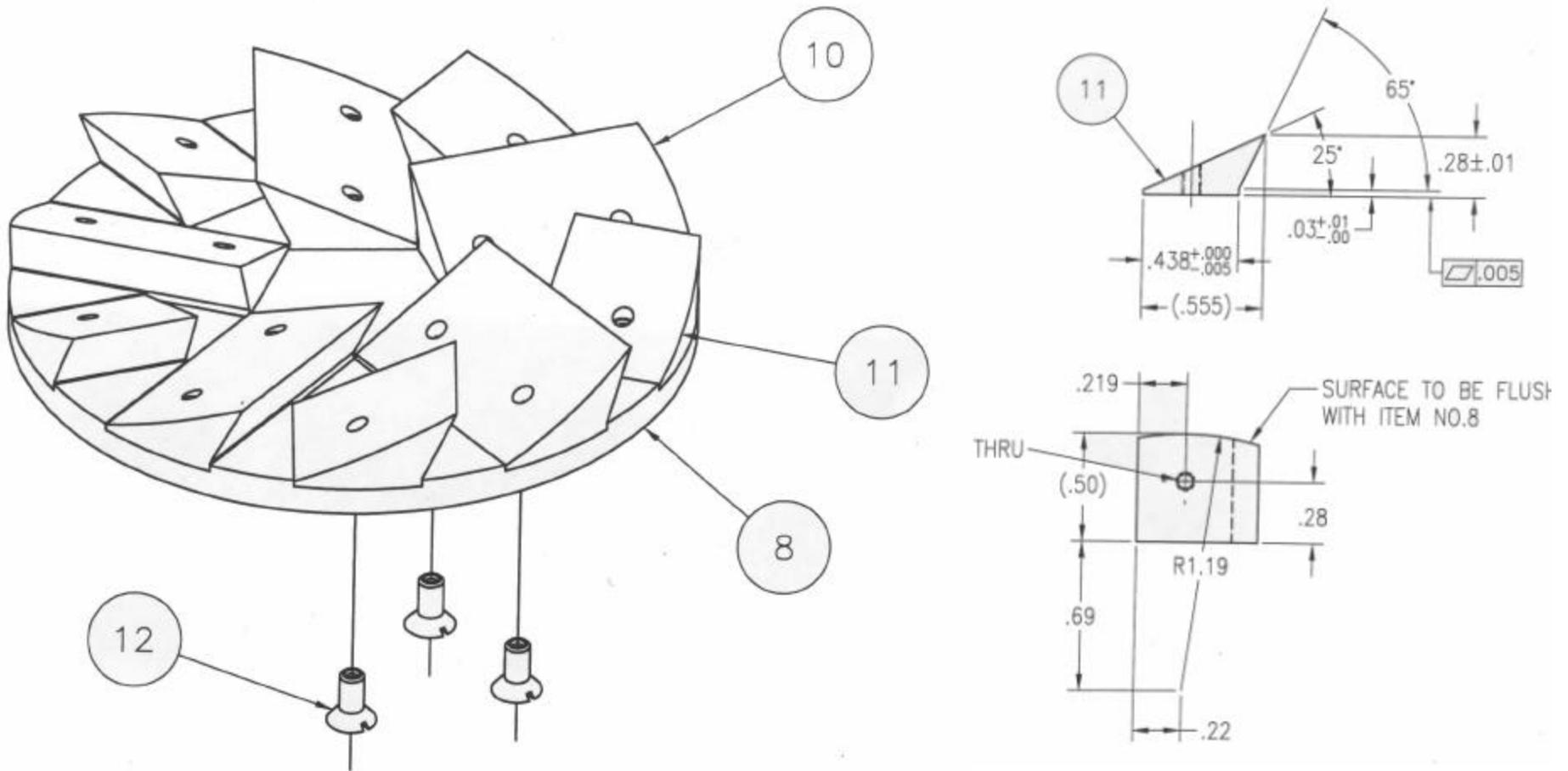


Figure 2-17 Fraction η of normally incident electrons that are backscattered from thick slabs of various materials, as a function of incident energy E . (From Tabata et al.¹⁸)

Absorber Geometry – John Brodowski



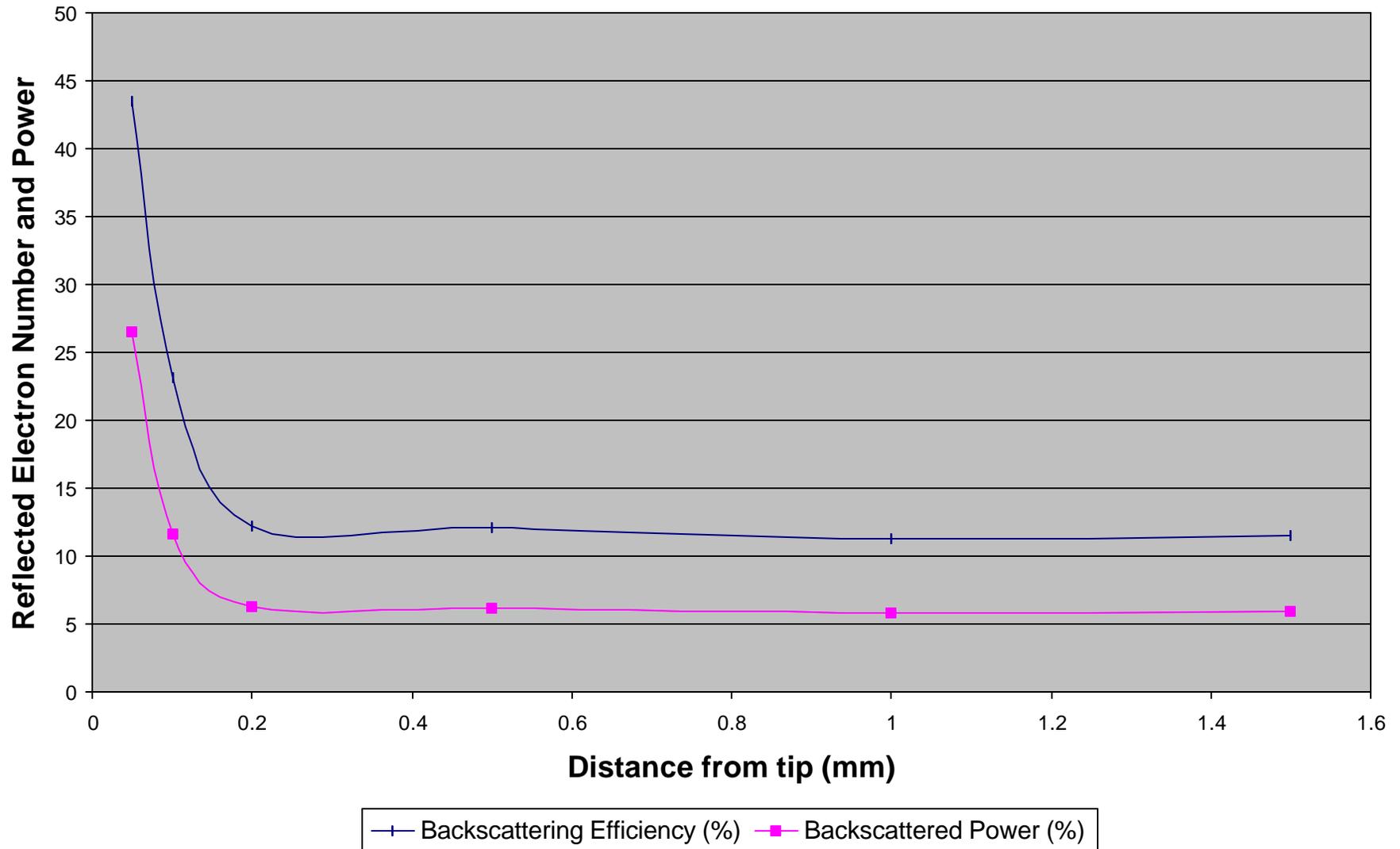
EGS Simulation Results



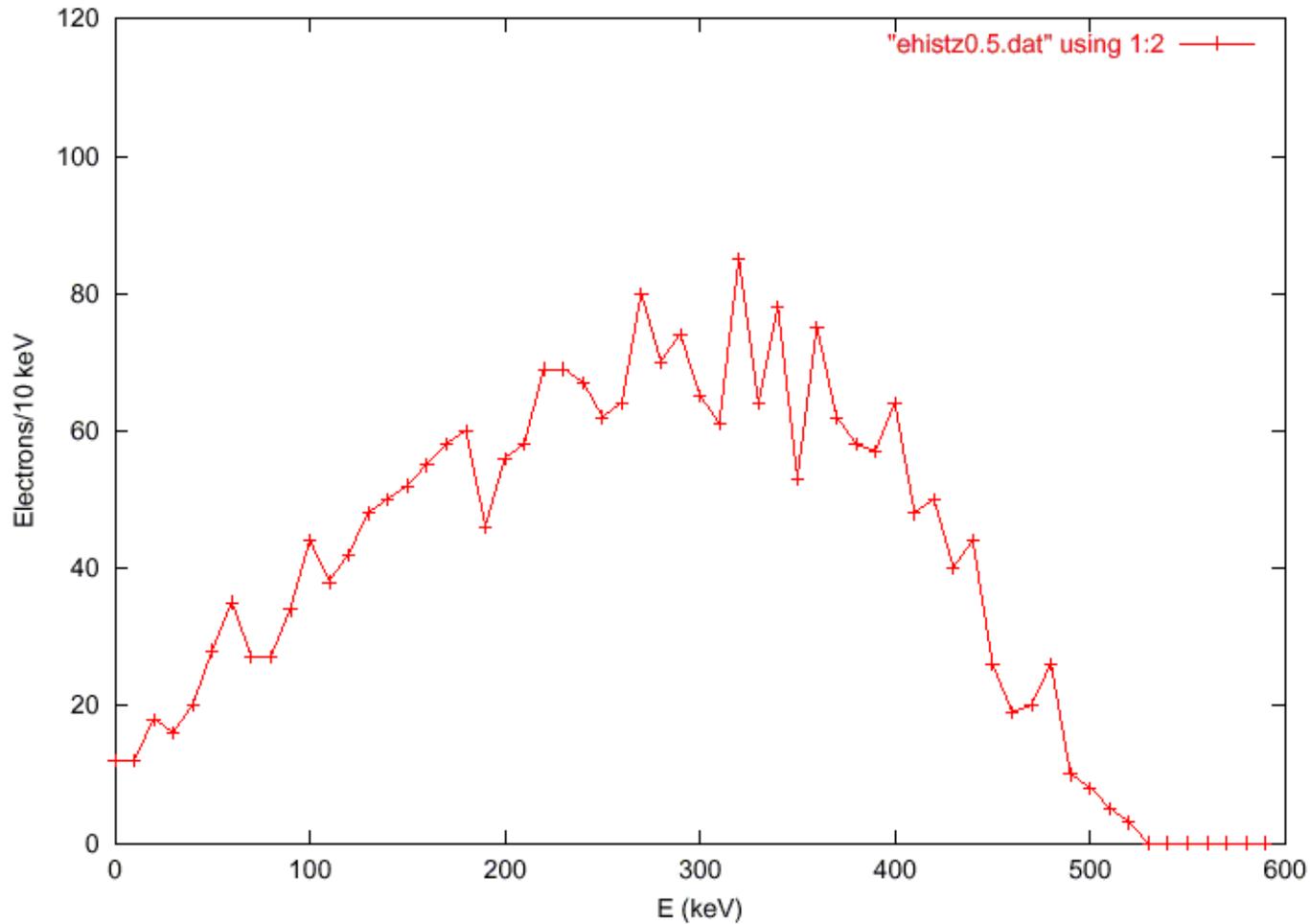
- EGS (Electron-Gamma-Shower: SLAC) simulation of 545 keV electrons on Copper
- Simulated Geometry:

EGS Simulation Results

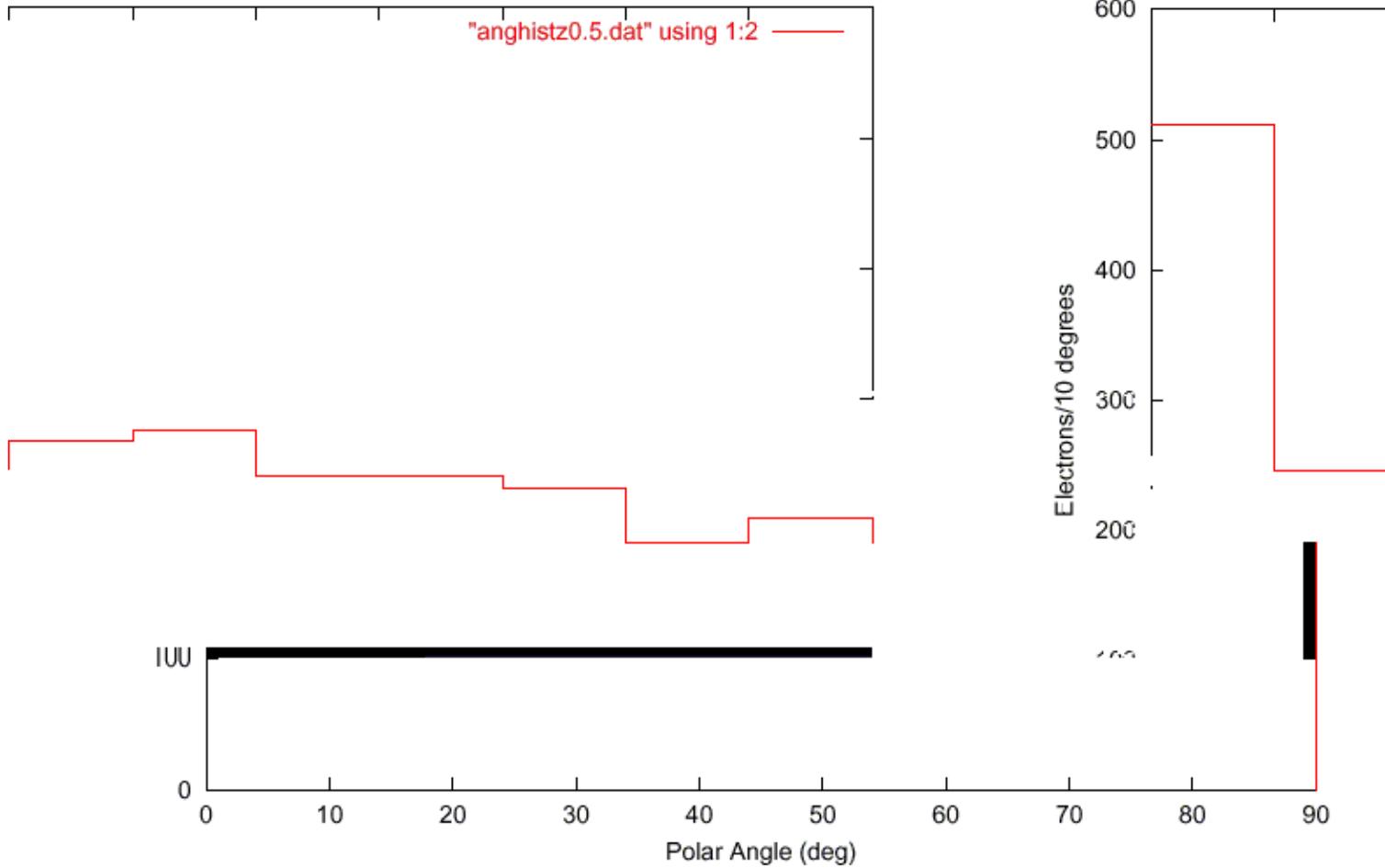
EGS Simulation Results



EGS Simulation – Energy Spectrum



EGS Simulation – Angular Distribution



Conclusions



- About 15% of electrons (6×10^{13}) are reflected back towards the foil, carrying about 7% of incident electron power (140 Watts)
- Concerns:
 - These backscattered electrons may land on an uncooled portion of stainless steel vacuum chamber
 - They may contribute to foil heating
 - They will produce lower-energy secondaries which may interact with the beam.
- We should further optimize the absorber geometry and perhaps use a different absorber material